The Heritage Foundation: Keynote Remarks

"Options for Maintaining a Robust, Adequate and Efficient Military Industrial Base"

Strengthening the Technological and Industrial Base for a Transformed National Security Environment

DUSD (Industrial Policy)

February 23, 2005

DUSD (Industrial Policy): Roles, Responsibilities, and Operational Responsibilities

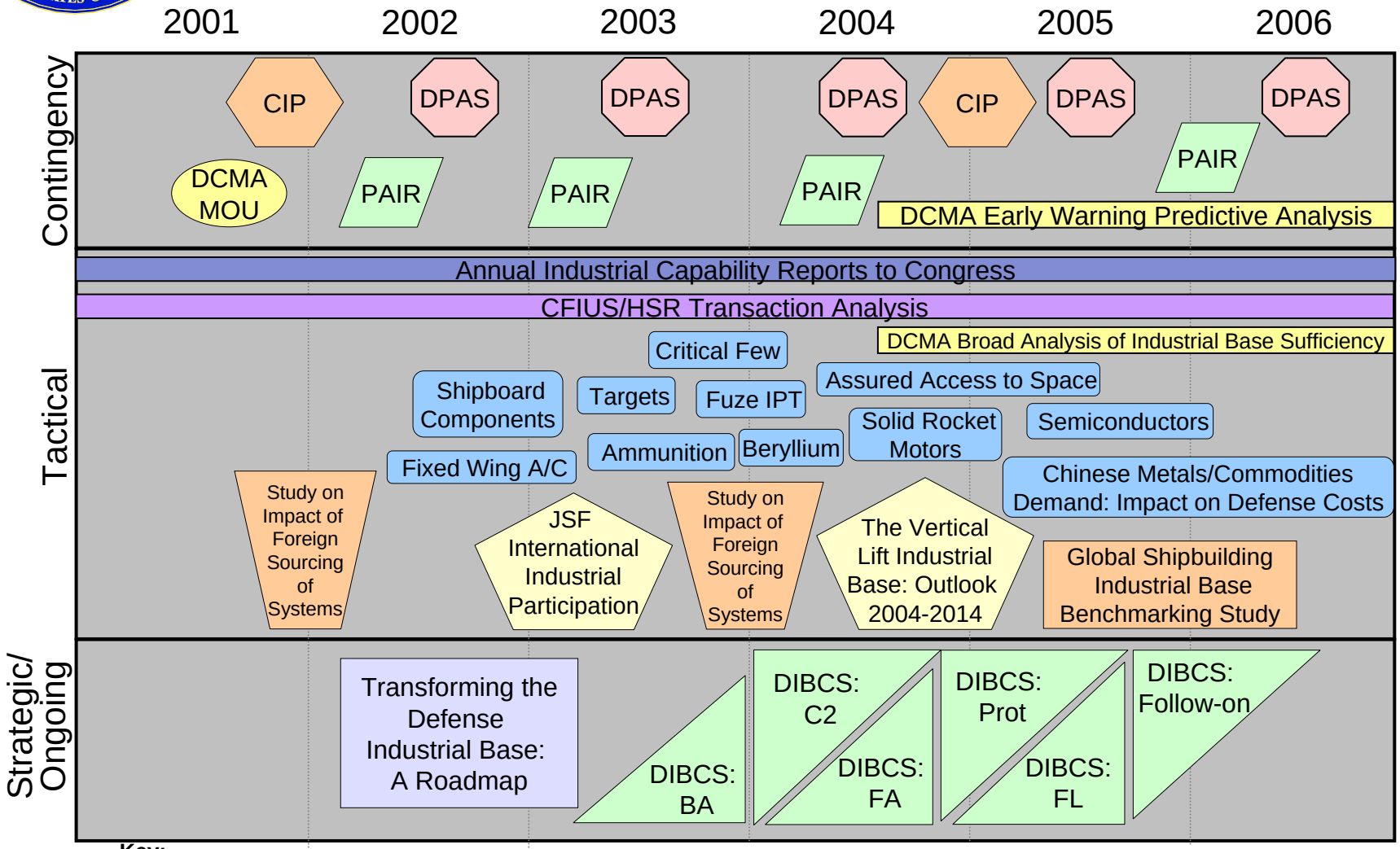
In addition to industrial base policy formulation, ODUSD(IP) has a major role in:

- Weapon System Acquisition Decisions
  - Milestones and Program Reviews
  - Acquisition Strategies
- Merger and Acquisition Reviews
  - Hart-Scott-Rodino
  - Exon-Florio
- Defense Priorities and Allocations System (DPAS)
- Priority Allocation of Industrial Resources (PAIR)
  - Chair of Task Force

Is situated on staff of Under Secretary of Defense (Acquisition, Technology, & Logistics) with:

- Director, Defense Research & Engineering - ensures superior and affordable technology to support warfighters with revolutionary, war-winning capabilities
- Director, Defense Systems - provides technical and programmatic evaluation, and acquisition oversight, for strategic and tactical programs
- Director, Acquisition Resources & Analyses - integrates and manages diverse AT&L resources to support National Strategy; manages DAES, DABs, EVMS, SARs/CARs, Nunn-McCurdy
- Director, Defense Procurement and Acquisition Policy - develops acquisition policies and practices to promote flexibility and take advantage of the global marketplace
- Office of the General Counsel - serves as DoD point of contact for Hart-Scott-Rodino

DUSD(IP) Industrial Base Activities



Key:

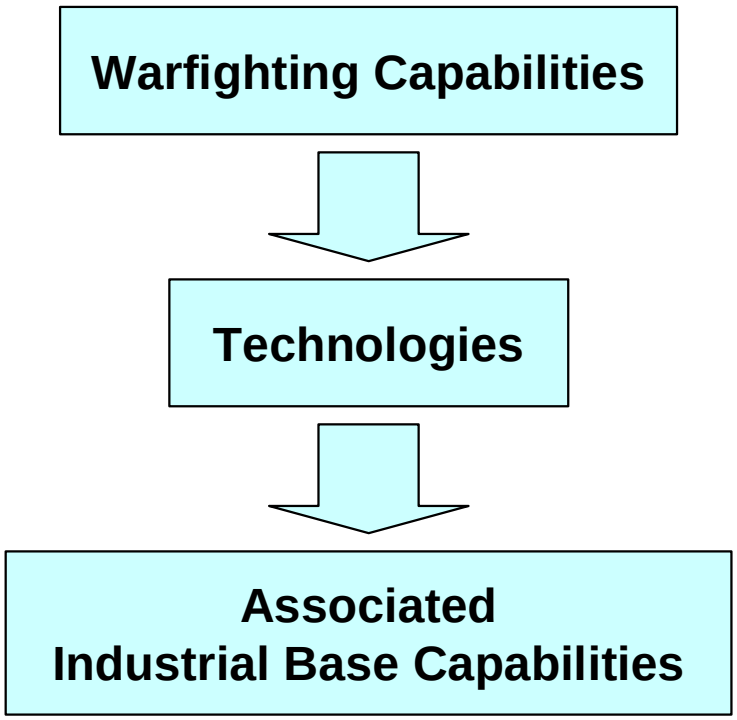
DCMA = Defense Contract Management Agency
CIP = Critical Infrastructure Program
PAIR = Priority Allocation of Industrial Resources
DPAS = Defense Priority and Allocations System
CFIUS = Committee on Foreign Investment in the U.S.
HSR = Hart Scott Rodino

Department-wide Industrial Base Assessments

	2003	2004
Sector/Functional Capability Studies	3	9
Materials & Components Studies	13	19
Special Interest Studies	11	16

The DIBCS series complements ongoing Department-wide studies by mapping technology and industrial base capabilities to the new functional capabilities construct, providing a comprehensive baseline—and the long forward pass through 2020.

DIBCS Methodology Overview



Description

Capabilities identified and prioritized according to leadership goals.
- Capabilities identified independent of platform or program solutions

Technologies identified for most important warfighting capabilities and prioritized

Industrial base capabilities assessed for the most important technologies

"This methodology is consistent with the operational ethos embodied in the U.S. defense industrial base: warfighting capabilities, and the warfighter as the primary constituent, must drive defense demand and the products the Department acquires."

Source: Booz Allen Hamilton and ODUSD(IP)

DIBCS Methodology: Force Application Example

1 Identify U.S. Leadership Goals for Capabilities

DIBCS FA Comprehensive Capability Areas	Specific Capabilities by Leadership Goal			
	Neutral	Equal	Be Ahead	Be Way Ahead
Maneuver to Engage	0	33	39	25
Engagement Maneuvering	2	34	86	66
Engagement	5	175	267	304
1036 TOTAL	7	242	392	395

Decompose capabilities and identify functions to determine enabling technologies

2 Determine Enabling Technologies for Be Ahead/Be Way Ahead Capabilities

Critical Technology/ Industry List (212)

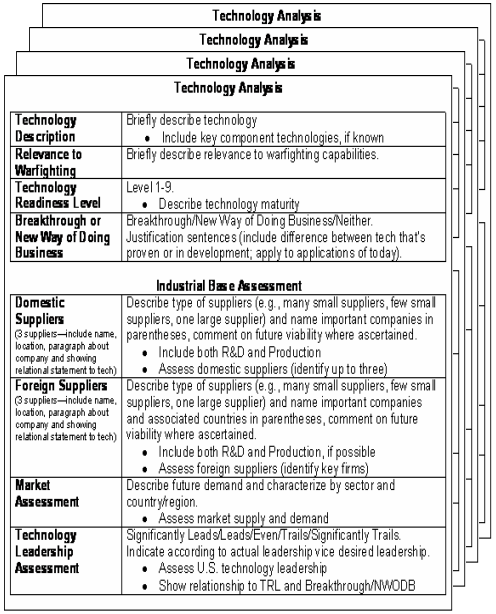
- Acoustic Energy Weapons
- Explosive Weapons
- Devices
- Guns/Cannons
- Kinetic Energy Weapons
- Optical Energy Weapons
- Propulsion
- RF Energy Weapons
- Special Purpose Weapons
- Structures
- Weapons Fuses
- Weapons Guidance and Control
- …

Prioritize technologies to focus and scope assessments

Priorities based upon:
- Type of capability enabled (*Be Ahead/Be Way Ahead*)
- Breakthrough or transformational nature of the technology
- Number capabilities enabled by technology (span of impact)

3 Assess Industrial Base Capabilities for Each Critical Technology

DIBCS Execution Team – a tailored team of experts
- Senior Advisory Group
- Program Manager and Core Team
- Operations/Policy and Technology Subject Matter Experts



Technology Analysis

Technology Description	Briefly describe technology • Include key component technologies, if known
Relevance to Warfighting	Briefly describe relevance to warfighting capabilities.
Technology Readiness Level	Level 1-9. • Describe technology maturity
Breakthrough or New Way of Doing Business	Breakthrough/New Way of Doing Business/Neither. Justification sentences (include difference between tech that's proven or in development; apply to applications of today).

Industrial Base Assessment

Domestic Suppliers (3 suppliers—include name, location, paragraph about company and showing relational statement to tech)	Describe type of suppliers (e.g., many small suppliers, few small suppliers, one large supplier) and name important companies in parentheses, comment on future viability where ascertained. • Include both R&D and Production • Assess domestic suppliers (identify up to three)
Foreign Suppliers (3 suppliers—include name, location, paragraph about company and showing relational statement to tech)	Describe type of suppliers (e.g., many small suppliers, few small suppliers, one large supplier) and name important companies and associated countries in parentheses, comment on future viability where ascertained. • Include both R&D and Production, if possible • Assess foreign suppliers (identify key firms)
Market Assessment	Describe future demand and characterize by sector and country/region. • Assess market supply and demand
Technology Leadership Assessment	Significantly Leads/Leads/Even/Trails/Significantly Trails. Indicate according to actual leadership vice desired leadership. • Assess U.S. technology leadership • Show relationship to TRL and Breakthrough/NWODB

Source: Booz Allen Hamilton and ODUSD(IP)

DIBCS Methodology: Results for First Four Functional Concepts

Methodology Execution

List of key *(BA/BWA)* Capabilities	Identify Technology Solutions and Create Technology List	Prioritize Tech List and Down-select Initial Priority Assessment List	Elaborate on Key Components	Assess Industrial Base for Techs and Components

Sector	Total # Cap.	Be Ahead	Be Way Ahead
BA	436	169	188
C2	255	146	43
FA	1,036	392	395
Prot	629	323	117
FL	TBD	TBD	TBD
Total	2,356	1,030	743

Sector	Number Techs
BA	278
C2	293
FA	212
Prot	277
FL	TBD
Total	1,060

Sector	Techs Assessed
BA	31
C2	35
FA	32
Prot	39
FL	TBD
Total	137

Sector	Components Assessed
BA	41
C2	23
FA	29
Prot	25
FL	TBD
Total	118

Sector	Techs Sufficient	Potential Issues
BA	69	3
C2	55	3
FA	53	6 + 2WL
Prot	55	7 + 2WL
FL	TBD	TBD
Total	232	19 + 4WL

Scope of DIBCS series systematically defines the most important technologies associated with 21st century *Be Ahead/Be Way Ahead* capabilities and is increasingly informing DoD processes and assessments.

Source: Booz Allen Hamilton and ODUSD(IP)

What Else Have We Learned?

Examples of new insights into the industrial base via DIBCS:

- Importance of small and/or emerging suppliers (35-45% with less than 100 employees)
- Importance of protecting sufficient number of innovative sources for widely-applied, innovative technologies still in R&D (e.g., swarming control tools)

"If the Department is often accused of preparing to fight the last war, the purpose of the DIBCS series is to assure that the industrial base available to the Department in the 2015-2020 timeframe can produce the warfighting capabilities required then. In this way, the DIBCS series complements the Department's day-to-day activities that ensure the current defense industrial base can meet contingency and near-term warfighting requirements."

Backup

Department-wide (ODUSD(IP)) Industrial Capability Assessments

- Defense Industrial Base Capabilities Study: Protection (Dec 2004)
- Foreign Sources of Supply: Assessment of the United States Defense Industrial Base (Nov 2004)
- DIBCS: Force Application (Oct 2004)
- The Vertical Lift Industrial Base: Outlook 2004-2014 (Jul 2004)
- DIBCS: Command and Control (Jun 2004)
- Beryllium Metal Industrial Base (May 2004)
- DoD Fuze IPT Industrial Capabilities Assessment (May 2004)
- DIBCS: Battlespace Awareness (Jan 2004)
- Impact of Foreign Sourcing of Systems (Jan 2004)
- Joint Strike Fighter International Industrial Participation Study (Jun 2003)
- Consideration of a Consolidated DoD Semiconductor Foundry (Jul 2003)
- Transforming the Defense Industrial Base: A Roadmap (Feb 2003)

Service-Specific Industrial Capability Assessments

- Army
  - Capacity for Armor Plate Steel (Throughout 2004)
  - Heavy Transmission Industrial Base Study (Dec 2004)
  - Capacity for Light Weight Armor, Aramid Materials (Dec 2004)
  - Engines for Medium Combat Vehicles (Oct 2004)
  - Army Transformation Industrial Base Study, Future Force Industrial Capability Assessment (Sep 2004)
  - Meeting Increased Demand for Operational Requirements--Surge Contracting Emphasized in Policy (Aug 2004)
  - Jammer Production Capability Assessment (Jun 2004)
  - Small Caliber Ammunition (Jan 2004)
  - Combat Vehicle Track Shoes Sub-Sector Assessment (May 2003)
  - Transformation Industrial Base Study (Apr 2003)
- Navy
  - U.S. Microwave Tube Industry (Nov 2004)
  - Heavy Lift Replacement Helicopter Industrial Capability Study (Nov 2004)
  - JSOW UNITARY Industrial Capability Assessment (Oct 2004)
  - Depot Source of Repair Capability Assessment for the Expeditionary Fighting Vehicle (EFV) Hydro-pneumatic Suspension Unit (HSU) Depot Repairable Items (Sep 2004)
  - T700 Compressor Durability Improvement (May 2004)
  - Surface Combatant Shipbuilding Industrial Base (Mar 2004)
  - Update of Microwave Power Tube Industrial Assessment (Dec 2003)
  - Expeditionary Fighting Vehicle Studies (Aug 2003)
  - Submarine Storage Battery Industrial Base Capabilities Assessment (Jul 2003)
  - CNV21 Industrial Base Assessment (Mar 2003)
- Air Force
  - Missiles and Munitions Industrial Base Financial Health and Market Analysis (Sep 2004)
  - Space Industrial Base Financial Health and Market Analysis (May 2004)
  - Power Sources Industrial Base Assessment (Apr 2004)
  - Laser Detection and Ranging (LADAR) Seeker Industrial Base Assessment (Jan 2004)
  - Joint Fire Fighter Integrated Response Ensemble (JFIRE) Industrial Base Assessment (Jan 2004)
  - Panoramic Night Vision Goggles Industrial Base Assessment (Oct 2003)
  - Small Gas Turbine Engines, “Supply Base Production & Support” (Oct 2003)
  - Fuel Cell and Hydrogen Reformer Supply Base Assessment (Sep 2003)
  - Radiation Hardened Components Assessment for Transformational Communication System and Space-Based Radar (Aug 2003)
  - Advanced Concept Technology Demonstrations Manufacturing & Producibility Reviews (Jun 2003)
  - Key Munitions’ Components (Thermal Batteries and Fuzes) (Jun 2003)
  - Inertial Technology Supply Base (Mar 2003)

DoD Component Industrial Capability Assessments

- Defense Contract Management Agency
  - Energy Constraints on the Defense Industrial Base (Nov 2004)
  - Crew Crashworthy Seat Industrial Sector Study (Oct 2004)
  - Munitions Capability Analysis (Sep 2004)
  - Seamless Stainless Steel Tubing for Aerospace Applications Industrial Capability Assessment (Jul 2004)
  - Aircraft Flexible Shafts and Couplings Study (Jul 2004)
  - Aerial Target Industrial Base Study (May 2004)
  - Aircraft Transparency Sector Analysis (May 2004)
  - Industrial Assessment of the Weapons Battery Industry (Feb 2004)
- Defense Logistics Agency
  - Rapid Assembly Program Follow-on (Oct 2004)
  - Joint Services Lightweight Integrated Suit Technology (JSLIST) Ensemble (Oct 2004)
  - Extreme Cold Weather Clothing System (ECWCS) (Oct 2004)
  - Domestic Industrial Base for Textiles Apparel and Footwear (Oct 2004)
  - Meals Ready to Eat (MRE) (Oct 2004)
  - Tray Pack Ration Readiness (Oct 2004)
  - Nerve Agent Antidotes in Autoinjectors Follow-on (Nov 2003)
  - Small Arms Protective Inserts (Nov 2003)
  - Joint Services Lightweight Integrated Suit Technology Follow-on (Oct 2003)
  - Pharmaceutical, Medical/Surgical, Medical Equipment Follow-on (Oct 2003)
  - Tray Pack Ration Readiness Follow-on (Sep 2003)
  - Reverse Osmosis Water Purification Unit Capability Assessment (Mar 2003)
- Missile Defense Agency
  - LADAR/LIDAR Industrial and Technology Capability Assessment (Oct 2004)
  - Inertial Measurement Unit Industrial and Technology Capability Assessment (Aug 2004)
  - Radiation-Hardened Electronics Industrial Capability Assessment (Jul 2003)
  - Infrared Sensor Industrial Capability Assessment (Jun 2003)
  - Batteries Industrial Capability Assessment (May 2003)
  - Laser Detection and Ranging and Light Detection and Ranging Systems Industrial Capability Assessment (Mar 2003)
  - Divert and Attitude Control System Industrial Capability Assessment (Feb 2003)

Related Industrial Capability Activities/Working Groups

- High Temperature Flexible Aerogels
- Thermal Batteries
- Silicon Carbide Substrates
- Laser Eye Protection
- Microwave Power Tube Materials and Components
- Radiation-Hardened Electronics Capital Expansion
- Radiation-Hardened Microprocessors
- Silicon Carbide Substrates
- Yttrium Barium Copper Oxide High-Temperature Superconducting Coated Conductors
- Wireless Vibration Sensors
- Advanced and Rigid-Rod Polymer Materials

Industrial Base Issues – BA & C2

	Technology	Industrial Base Sufficiency Analysis			Rationale
		Domestic Sources	Foreign Sources		
Battlespace Awareness	Active Hyperspectral Imager	4	3		U.S. capability trails potential adversaries' capabilities due to foreign technology advancements in civil applications.
	Active Electronically Scanned Array (AESA) Radar	2 major	5		Number of major domestic suppliers of AESA radars is probably still sufficient. However, degree of U.S. leadership is threatened by significant overseas competition.
	Maser Clocks	2	3		Maser clocks provide better precision and reliability than cesium atomic clocks and are standard in foreign GPS-like systems. U.S. capability is at best equal, and small market demand limits supplier base.
Command & Control	Helmet Mounted Display	5	4		Traditionally used for pilot applications, use of HMDs is now expanding into land warfare and U.S. leadership may be insufficient given new applications and essentiality to future warfighting concepts.
	Swarming Control Tools	Many[1]	Many[1]		U.S. research efforts are even with foreign institutions, with many foreign developers performing research in this technology area essential for remote vehicle control.
	Optical (Laser) Intersatellite Links	2	3		Competition with European and Japanese developers has been growing. Market is still small and presently two suppliers are adequate.

[1] Swarming Control Tools are still in R&D, not production.

Source: Booz Allen Hamilton and ODUSD(IP)

Industrial Base Issues – FA

	Technology	Industrial Base Sufficiency Analysis			Rationale
		Domestic Sources	Foreign Sources		
Engagement Maneuvering	Pulsed Plasma Thruster	2[1]	0		This technology offers a unique approach to space maneuvering (aiming) and is maturing with two companies in development and a number of companies and universities in research. The United States has a significant lead but only two domestic sources.
	Hypersonic Weapon Propulsion System	1	1		Propulsion system for long range air-to-ground and surface-to-surface weapon applications. Limited market size not likely able to support more than one supplier at this time. United States is even with no discernable technology lead—need to lead.
	Small Caliber Projectile Control Surfaces	0[1]	0		Early technology development, only two domestic researchers which lead the world. This supply base may be adequate at this time—particularly with no identified foreign competition—but the situation could change quickly and should therefore be closely monitored.
Engagement	GPS-Guided Small Diameter Bomb (SDB)	1	0		Breakthrough technology applicable to targets requiring low yield and high precision. United States has significant lead but opted for one supplier. A potential second source not continued after 2003 program down-select—policy on sole-source needs to be reviewed.
	Chemical Oxygen-Iodine Laser (COIL) (High/Low Power)	2 High 3[1] Low	0 High 3[1] Low		New way of defeating air targets. Two suppliers appear adequate for weapons-class chemical lasers, with a number of U.S. and foreign entities working similar technologies at lower power. United States leads but foreign research could be applied to higher power weapon system—further monitoring warranted.
	Self-Propagating High-Temperature Synthesis Device	1[1]	0[1]		Futuristic technical concept in the area of explosives. One supplier (13 employees) is probably not sufficient if U.S. military desires to move technology to production. The United States has a tenuous lead; one foreign research source identified. This situation warrants monitoring.

[1] Additional R&D underway, not yet in production..

Source: Booz Allen Hamilton and ODUSD(IP)

Industrial Base Issues – Protection

	Technology	Industrial Base Sufficiency Analysis			Rationale
		Domestic Sources	Foreign Sources		
Active Defense	Non-Lethal Millimeter Wave Active Denial System	1	0		This technology provides the ability to selectively control individual or group area access/transit without causing harm. It uses millimeter-wave electromagnetic energy to stop, deter, and turn back adversaries. One U.S. supplier may not be sufficient.
	30-mm Supercavitating-Supersonic Projectiles	3	1[1]		Breakthrough technology that provides surface or air launched projectiles with enhanced water entry, underwater speed, and effective depth penetration against mines, underwater vehicles, and swimmers. Technology leadership is rated *Even* because Russia has been developing this technology for decades. and France and possibly others are believed to have advanced programs. The United States must lead.
Passive Defense	Multi-Spectral Camouflage Cover	2	>3		Mature technology that provides the ability to deny detection of personnel and equipment with no major technology leaps foreseen. U.S. leadership is rated *Even* and is a concern.
	Regenerative Chemical-Biological Filtration	1	3		New way of doing business. Technology allows military vehicles and structures to provide long-lasting filtration without the constant filter replacement. Only one domestic supplier may be a concern.
	Plasma Antenna	3	3		Breakthrough technology that provides light, compact, rapidly reconfigurable antennas resistant to countermeasures and counter detection. Potentially disruptive technology where U.S. leadership has been rated as *Even* and should be monitored closely.
	Active Magnetic Signature Reduction System	2	>3		Mature technology that dynamically compensates to nullify magnetic signatures caused by metallic objects or their motion through the natural environment. U.S. leadership rated as *Even* with foreign suppliers and is a concern.
	Thermo-Insulating Paint for Low Observable Hullforms	2	1		Mature technology used throughout the world that allows for ships to effectively decrease their temperature signature to help avoid infrared detection. U.S. leadership rated as *Even*.

[1] Russia, France, Ukraine, and China may be working in this technology area. However, the limited publicly available information identified only one French research facility.

Source: Booz Allen Hamilton and ODUSD(IP)

FA "Watch List"

Technology	Industrial Base Sufficiency Analysis			Rationale
	Domestic Sources	Foreign Sources		
Million-Rounds-Per-Minute Gun (Metal Storm)	0	1		Breakthrough technology, one-of-a-kind projectile weapon. Developed by Australia. Actively being promoted to DoD and Department of State for military use and Embassy protection. Could provide adversaries a force multiplier capability. Appears U.S. government is not buying. No domestic suppliers.
Electro-Hydraulic Cavitation Device	1	0		Breakthrough technology for sea warfare, developed via SBIRs but apparently not being adopted by USN. Would provide an adversary the capability to compromise U.S. sea warfare capabilities.

The "Watch List" identifies technologies not likely to be part of the U.S. warfighting arsenal. They are important because they represent unusual technical solutions and pose challenges to U.S. warfighters if proliferated elsewhere.

Protection "Watch List"

Technology	Industrial Base Sufficiency Analysis			Rationale
	Domestic Sources	Foreign Sources		
Towed Fabric Balloon Pressure Sweep	0	1		This technology replicates aquatic vessel signatures to clear pressure mines. The Australian Defense Science and Technology Organization is spearheading this effort. No U.S. firms or research institutions appear to be working on pressure mine sweep technology of any kind.
Rigid Polyurethane Foam (RPF)	100s	Many		RPF can isolate the effects of explosive mines, in both ground and aquatic environments. It can shield personnel and equipment, thereby making the weapons ineffective. While widely available for commercial ship insulation applications, more investigation is needed with regard to application of this technology in a military sea and land environment.

The "Watch List" identifies technologies not likely to be part of the U.S. warfighting arsenal. They are important because they represent unusual technical solutions and pose challenges to U.S. warfighters if proliferated elsewhere.

BA & C2 Remedies

	Technologies	Industrial Base Sufficiency Analysis				Policy Levers		
		Phase	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Battlespace Awareness	Active Hyperspectral Imager	R&D	4	3		Invest in R&D technology using S&T portal	N/A	N/A
	Active Electronically Scanned Array (AESA) Radar	Prod	2 major	5		Promote investment in S&T for technologies that enable new applications	In near term programs, maximize competitive opportunities for weapon system design	Block teaming agreements for future competitions that do not increase innovation during weapon system design
	Maser Clocks	R&D	2	3		Invest in R&D and demo of technology using S&T portal	Provide competitive opportunities for this technology in weapon system design	N/A
Command & Control	Helmet Mounted Display	R&D/ Prod	5	4		Fund innovation in non-aviation applications	In near term programs, maximize competitive opportunities for weapon system design	Deny foreign acquisition of U.S. firms, particularly for non-aviation applications
	Swarming Control Tools	R&D	Many	Many		Invest in R&D to demonstrate technology and establish producers	Structure competitions to encourage new industry participants	Deny teaming agreements/ transactions that limit innovation
	Optical (Laser) Intersatellite Links	Prod	2	3		Continue investing in transition to manufacturing	Structure competitions to encourage new industry participants	Deny teaming agreements/ transactions that limit innovation

Source: Booz Allen Hamilton and ODUSD(IP)

FA Remedies

Technologies	Industrial Base Sufficiency				Policy Levers		
	Phase	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Pulsed Plasma Thruster	R&D	2[1]	0		Fund innovation as cooperative agreement with NASA.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming agreements and transactions that limit innovation. Monitor export control.
Hypersonic Weapon Propulsion System	R&D	1	1		Invest in R&D to demonstrate technology and establish producers.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming agreements and transactions that limit innovation. Monitor export control.
Small Caliber Projectile Control Surfaces	R&D	0[1]	0		Invest in R&D to demonstrate technology to gain sponsorship.	Structure competitions to foster the entry of additional sources.	Deny teaming agreements and transactions that limit innovation.
GPS-Guided Small Diameter Bomb (SDB)	R&D	1	0		Fund innovation by competitively establishing a second source.	Structure competitions to allow entry point for second source.	Monitor HSR to control second tier supplier consolidation.
Chemical Oxygen-Iodine Laser (COIL) (High/Low Power)	R&D	2 High 3[1] Low	0 High 3[1] Low		Fund demonstration of COIL for other warfighting applications.	Provide competitive opportunities for this technology in weapon system design.	Deny teaming that limits innovation; maintain present number of sources at minimum.
Self-Propagating High-Temperature Synthesis Device	R&D	1[1]	0[1]		Invest in R&D to demonstrate technology to gain sponsorship.	N/A	Stage competitions to add sources. Monitor export control.

[1] Additional R&D underway at other sources, not yet in production.

Source: Booz Allen Hamilton and ODUSD(IP)

Protection Remedies

Technologies	Industrial Base Sufficiency				Policy Levers		
	Technology Readiness Level (TRL)	Domestic Sources	Foreign Sources		Fund Innovation	Optimize PM Structure & Acq Strategy	External Corrective Measures
Non-Lethal Millimeter Wave Active Denial System	TRL 7	1	0		Invest R&D in additional sources to broaden industrial base and gain sponsorship.	Services conduct competitions to foster the entry of additional sources.	Consider for Militarily Critical Technology List. Monitor potential consolidation via HSR/CFIUS.
30-mm Supercavitating – Supersonic Projectiles	TRL 6	3	1[1]		Invest in R&D to establish U.S. technology leadership.	Conduct defense system design competitions for this technology.	Deny teaming arrangements and transactions that limit innovation; sustain sufficient suppliers.
Multi-Spectral Camouflage Cover	TRL 9	2	>3		Invest in R&D for next-generation camouflage; and to improve surveillance capabilities to defeat current camouflage.	Structure R&D investments to encourage competition and broaden the industrial base.	Monitor future foreign acquisition of U.S. suppliers. Monitor export control.
Regenerative Chemical-Biological Filtration	TRL 8	1	3		Fund development of additional U.S. sources.	Conduct defense system design competitions for this technology.	Deny teaming arrangements that limit innovation.
Plasma Antenna	TRL 6	3	3		Fund innovation to establish U.S. lead and adapt technology for additional applications.	Conduct defense system design competitions for this technology.	Deny teaming arrangements that limit innovation. Monitor export control.
Active Magnetic Signature Reduction System	TRL 9	2	>3		Invest in R&D to develop new U.S. suppliers, establish U.S. technology leadership, and improve sensors to defeat this technology.	Conduct defense system design competitions for this technology.	Deny teaming arrangements and transactions that limit competition. Monitor export control.
Thermo-Insulating Paint for Low Observable Hullforms	TRL 9	2	1		U.S. Navy should fund innovation to develop next-generation technological solution and U.S. sources.	U.S. Navy conduct defense system design competitions for next-generation technological solutions.	Deny teaming arrangements and transactions that limit competition. Monitor export control.

[1] Russia, France, Ukraine, and China may be working in this technology area. However, the limited publicly available information identified only one French research facility.

Source: Booz Allen Hamilton and ODUSD(IP)